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(54) Title of the invention	CONVEYOR DEVICE	
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SPECIFICATION

1. TITLE OF THE INVENTION

Conveyor device

2. SCOPE OF PATENT CLAIMS

A structure of a conveyor device characterized in that: a carrier block with its front and back edge slightly tapered in both the left and right direction is provided; feeding protrusions and a guiding rod having derail prevention strips in a protruding manner are provided, respectively, at both the side and center of the bottom side; a multiplicity of said carrier blocks are linked with an unending wire to comprise the carrier; the running track of said carrier is unendingly formed by the running guide plate on the left and right; a driving pulley is provided on one side and a driven pulley is provided on the other side of said running track; gears are provided on the external circumference of said driving pulley and driven pulley and by engaging the feeding protrusion of the carrier block with said gear the carrier is installed between the driving pulley and driven pulley; and a running guide groove is provided on the bottom of the running track and along the running track so that the guiding rod of each carrier block is fit and supported and freely runs.

3. DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a conveyor device that allows conveying in multi-dimensional directions using a carrier in which multiple carrier blocks are linked together.

Conventionally, belt conveyors, roller conveyors and chain conveyors have been generally known as conveyor devices. Among them, the belt conveyor has a simple structure and is most widely used, however, it is limited to a linear transfer and therefore, to change the direction of the transfer, multiple conveyors have to be combined during use. Furthermore, a roller conveyor allows a curved transfer, but it has a complicated structure and is extremely expensive. A chain conveyor allows a transfer in multiple directions, but it has a small tolerance for load weight; to install the chain, the short rings that comprise the chain have to be aligned by alternately facing each other, and therefore, it is difficult to assemble and fails often; and it generates noise due to the friction sound between the short rings.

The present invention has the purpose of eliminating the shortcomings of the aforementioned conventional devices, and providing a conveyor device that can have its transfer direction freely changed in multiple dimensions, by using a carrier having flexibility that is comprised of multiple carrier blocks linked by a wire.

Another purpose of the present invention is to provide a conveyor device such that guiding rods having derail prevention strips are provided in a protruding manner at the center of the bottom side of the carrier block that comprises the carrier, and these guiding rods are fit and supported in the running guide groove provided along the running track on the bottom surface of the running track so that they run freely, and therefore, the carrier can be freely sent in multiple directions that are appropriately formed with the running guide plates on the left and right.

Furthermore, with the present invention, gears are formed on the external circumference of the driving pulley and driven pulley provided on both sides of the running track, and the feeding protrusions of each carrier block that comprise the carrier are engaged with these gears, and the carrier is installed between the driving pulley and driven pulley. And therefore, the carrier can be smoothly and efficiently run by the rotation of the driving pulley.

In other words, the present invention has the structure of a conveyor device characterized in that: a carrier block with its front and back edge slightly tapered in both the left and right direction is provided; feeding protrusions and a guiding rod having derail prevention strips in a protruding manner are provided, respectively, at both the side and center of the bottom side; a multiplicity of said carrier blocks are linked with an unending wire to comprise the carrier; the running track of said carrier is unendingly formed by the running guide plate on the left and right; a driving pulley is provided on one side and a driven pulley is provided on the other side of said running track; gears are provided on the external circumference of said driving pulley and driven pulley and by engaging the feeding protrusion of the carrier block with said gear the carrier is installed between the driving pulley and driven pulley; and a running guide groove is provided on the bottom of the running track and along the running track so that the guiding rod of each carrier block is fit and supported and freely runs.

Next, the conveyor device of the present invention is described by referring to illustrated embodiments. (1) is a carrier, and is comprised of a multiplicity of carrier blocks (2), (2) . . . which are linked with an unending wire (3). The carrier blocks (2) are made of synthetic resin or metal, etc., and have a flat top surface as well as inclined surfaces (4) in which the edges on the front and back are slightly tapered towards the left and right. These inclined surfaces (4) provided on the front and back of the sides on both the left and right sides are provided so that the carrier (1), which is comprised of linked carrier blocks (2), (2) . . ., can be easily flexed. It may be straight or curved. When these inclined surfaces (4) have an excessive inclination, large spaces are generated between the carrier blocks (2) and (2) that are positioned in front and back, and it is disadvantageous. Having the front and back sides of the carrier blocks (2), (2) . . . have a curve with a convex center allows carrier (1), which is comprised of linked carrier blocks (2), (2) . . . , to easily flex in the vertical direction. In addition, feeding protrusions (5) and (5) are provided at the center in front and back on both sides of the bottom surface of the carrier block (2). When the carrier blocks (2), (2) . . . are linked, the feeding protrusions (5) and (5) provided on the bottom surface of the carrier block (2) are positioned on the bottom surface of both sides thereof, namely on the bottom surface of both sides of the carrier (1), and aligned at even intervals. In addition, a guiding rod (6) is provided at the center of the bottom surface of the carrier block (2). This guiding rod (6) is to guide the running of the carrier (1), which is comprised of linked carrier blocks (2), (2) . . . Also, derail protection strips (7) that are projected in the right and left direction are provided on the guiding rod (6). (8) is a through-hole provided at the center of the carrier block (2) in the direction of the front and back, in order to insert the wire (3) that links the carrier blocks (2), (2) . . . , and it is desirable for the opening to be wider than the inside. There are several ways to insert the wire (3) through the carrier blocks (2), (2) . . . such as: so that each of the carrier blocks (2), (2) . . . can freely move relative to the wire (3); so that each of the carrier blocks (2), (2) . . . cannot move relative to the wire (3) but are rotatable; and so that each of the carrier blocks (2), (2) . . . are held in an integrated manner so that none of them moves relative to the wire (3). The embodiments shown in Figures 4 and 5 show the case where a carrier block (2) is held so that it does

not move relative to the wire (3), but is rotatable. In other words, a carrier block (2) is split into the top block (2a) and bottom block (2b) so that the through-hole (8) is split into the top and bottom, and latch concave portions (9) and (9) are provided at the center at the front and back of the through-hole (8) that is split into the top and bottom, so that the latching sphere (10) provided on the wire (3) fits into it. The latching sphere (10) of the wire (3) is fit on the latch concave portion (9) of the split bottom block (2b), and the wire (3) is fit in the bottom part of the through-hole (8). Then the split top block (2a) is laid on top and the bottom block (2b) and top block (2a) are coupled in an integrated manner using screws (11), and therefore, the carrier block (2) can be held so that it does not move relative to the wire (3) but it is rotatable. In the case of this embodiment, as shown in Figure 6, by having two or two consecutive latch concave portions (9) on the through-hole (8) that is split into a top and bottom, the latching sphere (10) provided at the end of the wire (3) can fit through both the left and right sides of the through-hole (8), and therefore, it is advantageous because the carrier block (2) can be used as is when adding wires (3) and (3) or connecting the wire (3) in an unending fashion. In addition, the embodiment shown in Figure 7 shows a case where the carrier block (2) is held in an integrated manner so that it does not move relative to the wire (3). In other words, the through-hole (8) provided on the carrier block (2) has a size such that a latching sphere (10) on the wire (3) fits, and a semispherical latch concave portion (9) is provided on the top side or the bottom side at the center of the front and back of the through-hole (8) so that the latching sphere (10) of the wire (3) inserted through the through-hole (8) fits in the latch concave portion (9) at the center position, and then, the latching sphere (10) that is fit in the latch concave portion (9) is pressed by a latching screw (12) that is provided on the facing position of the latch concave portion (9) in a manner in which it can freely move forwards and backwards. And thus the carrier block (2) can be held in an integrated manner so that it does not move relative to the wire (3). (13) is a supporter and is provided on the surface of the carrier blocks (2), which is at an appropriate position on the carrier (1), projecting from the surface, to support objects that are conveyed facing up. (14) is a running track and is structured in an unending manner and is comprised of running guide plates (15) and (15) on the left and right and a connecting member (16) that supports the running guiding plates (15) and (15) at even intervals. These are assembled using attaching bolts (17), etc. The left and right running guiding plates (15) and (15) that form this running track (14), and the connecting member (16) can be prepared as a single unit, but a variety of types, such as a straight line member, curved members on the left and right, and curved members for up and down can be prepared and connected as required to assemble a running track (14) of the desired shape. (18) is a running guide groove and is provided along with the running track (14) on a member that comprises the bottom portion of the running track (14), such as a connecting member (16), and the guiding rod (6) that is provided at the center of the bottom side of a carrier block (2) that comprises the carrier (1) fits in it so that it runs freely. (19) is a guiding latch groove and it supports the derail protection strips (7) that are provided on the guiding rod (6) in a protruding manner, and it is evaginated on the inner side of the running guide groove (18). (20) is a driving pulley that is provided on one side of the running track (14) and is rotary driven by a motor (23), etc., that is installed outside the running guide plates (8) [*sic*]. An external circumference groove (21), in which the guiding rods (6), (6) . . . that protrude at the center of the bottom side of the carrier blocks (2), (2) . . . that comprise the carrier (1), is provided at the center of the circumference of the driving pulley (20). Also, on the rim of the external circumference at the left and right side of the above, a gear (22) is provided that has latching concave portions at even intervals, and the feeding protrusions (5), (5) . . . that are provided on the carrier blocks (2), (2) . . . , which are positioned on the left and right of the bottom side of the carrier (1) engage with the gear (22). The carrier (1) that is comprised of linked carrier blocks (2), (2) . . . is installed between the driving pulley (20) provided on one side of the driving track (14) and a driving pulley that is provided on the other side of the driving track (14) and has the same shape as the driving pulley (20). And thus, the carrier (1) runs on the running track (14) by the driving rotation of the driving pulley (20), and consequently, conveys the appropriate objects in multiple directions.

With the conventional conveyor device, as many conveyor devices are required as the number of directional changes that require conveying, which depends on the changes in the direction of the transfer, and consequently, a wide space is required to install these conveyor devices. However, with the present invention, a carrier with flexibility that is comprised of multiple carrier blocks linked with wire is structured so that it has a benefit in that the direction of the transfer can be fully changed in multiple dimensions.

In addition, with the present invention, guiding rods having derail prevention strips are provided in a protruding manner at the center of the bottom side of the carrier block that comprises the carrier, and these guiding rods are fit and supported in the running guide groove provided along the running track on the bottom surface of the running track so that they run freely. Therefore, it has the benefit that the carrier can be freely sent in multiple directions that are appropriately formed with the running guide plates on the left and right.

Furthermore, with the present invention, gears are formed on the external circumference of the driving pulley and driven pulley provided on both sides of the running track, and the feeding protrusions of each carrier block that comprise the carrier are engaged with these gears, and the carrier is installed between the driving pulley and driven pulley. Therefore, the carrier can be smoothly and efficiently run by the rotation of the driving pulley.

And therefore, the present invention does not require a wide space to install the conveyor device, allowing easy layout in a factory, and it can be freely installed to match the layout of the existing machine tools, etc.

4. BRIEF DESCRIPTION OF THE DRAWINGS

The figures show the embodiments of the device of the present invention. Figure 1 is an entire lateral view, Figure 2 is a planar view that shows a portion of the carrier, Figure 3 is a cross-sectional view of the relevant part, Figure 4 is a perspective view of the split carrier block, and similarly, Figure 5 is a longitudinal cross-sectional view of the splittable carrier block, Figure 6 is a longitudinal cross-sectional view that shows another embodiment of the splittable carrier block, Figure 7 is a longitudinal cross-sectional view that shows another embodiment of the carrier block, Figure 8 is a lateral view of the running track that is flexed in the upper direction, Figure 9 is a planar view of the running track that is flexed in the lateral direction, Figure 10 is a lateral view of the driving pulley, and Figure 11 is a cross-sectional view of Figure 10 that is cut across the line A–A'.

Descriptions of the reference numerals in the drawings are as follows.

(1) Carrier, (2) Carrier block
(3) Wire, (4) Inclined surface
(5) Feeding protrusion, (6) Guiding rod
(7) Derail protection strip, (8) Through-hole
(9) Latch concave portion (10) Latching sphere
(11) Screw, (12) Latch screw
(13) Supporter, (14) Running track
(15) Running guide plate
(16) Connecting member
(17) Attaching bolt
(18) Running guide groove
(19) Guiding latch groove, (20) Driving pulley
(21) External circumference groove, (22) Gear

[see source for figures]

FIGURE 1

FIGURE 2

FIGURE 4

FIGURE 3

FIGURE 5

[see source for figures]

FIGURE 6

FIGURE 8

FIGURE 7

FIGURE 9

FIGURE 10

FIGURE 11